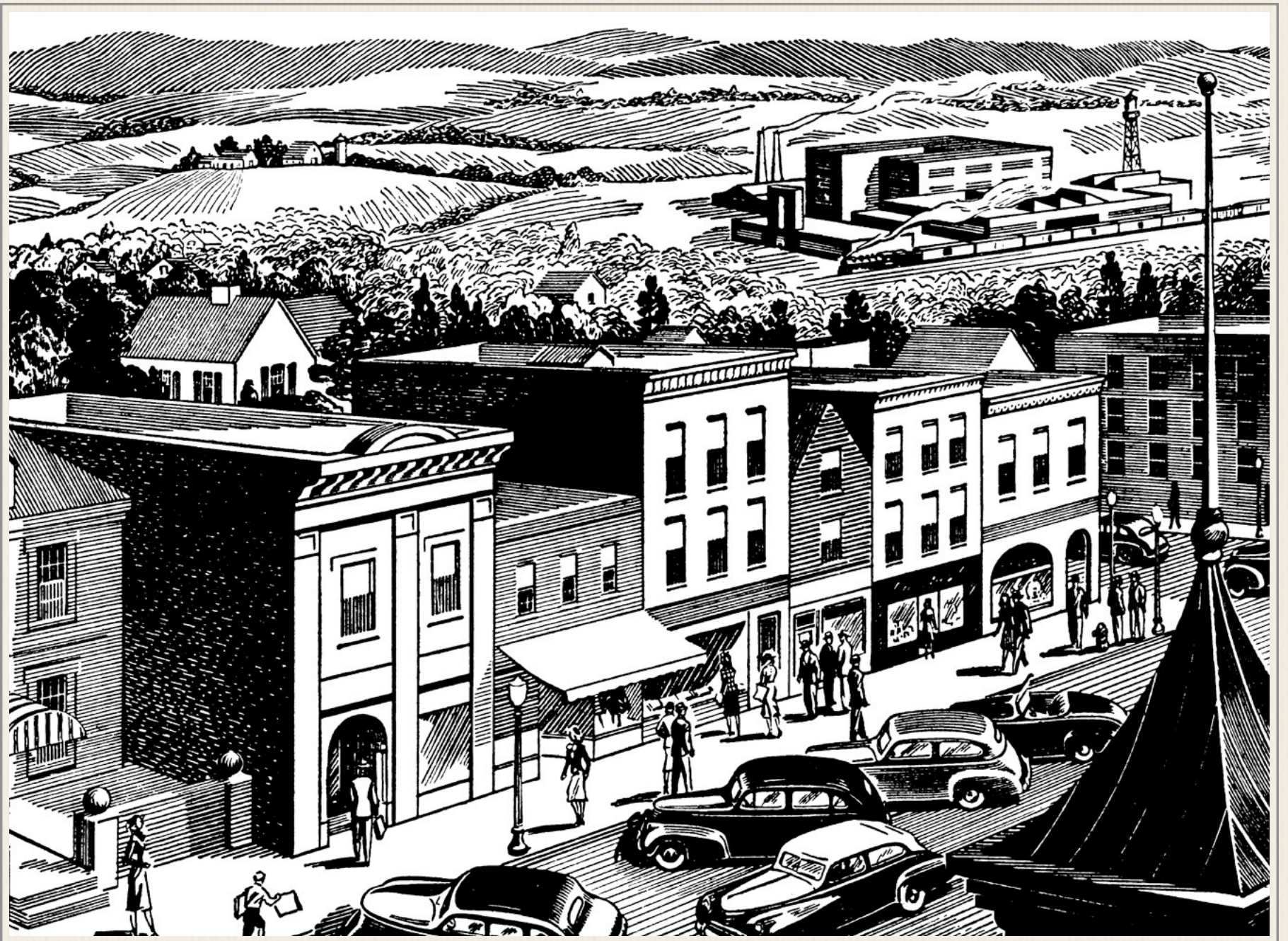




# Book Title



LOREM IPSUM

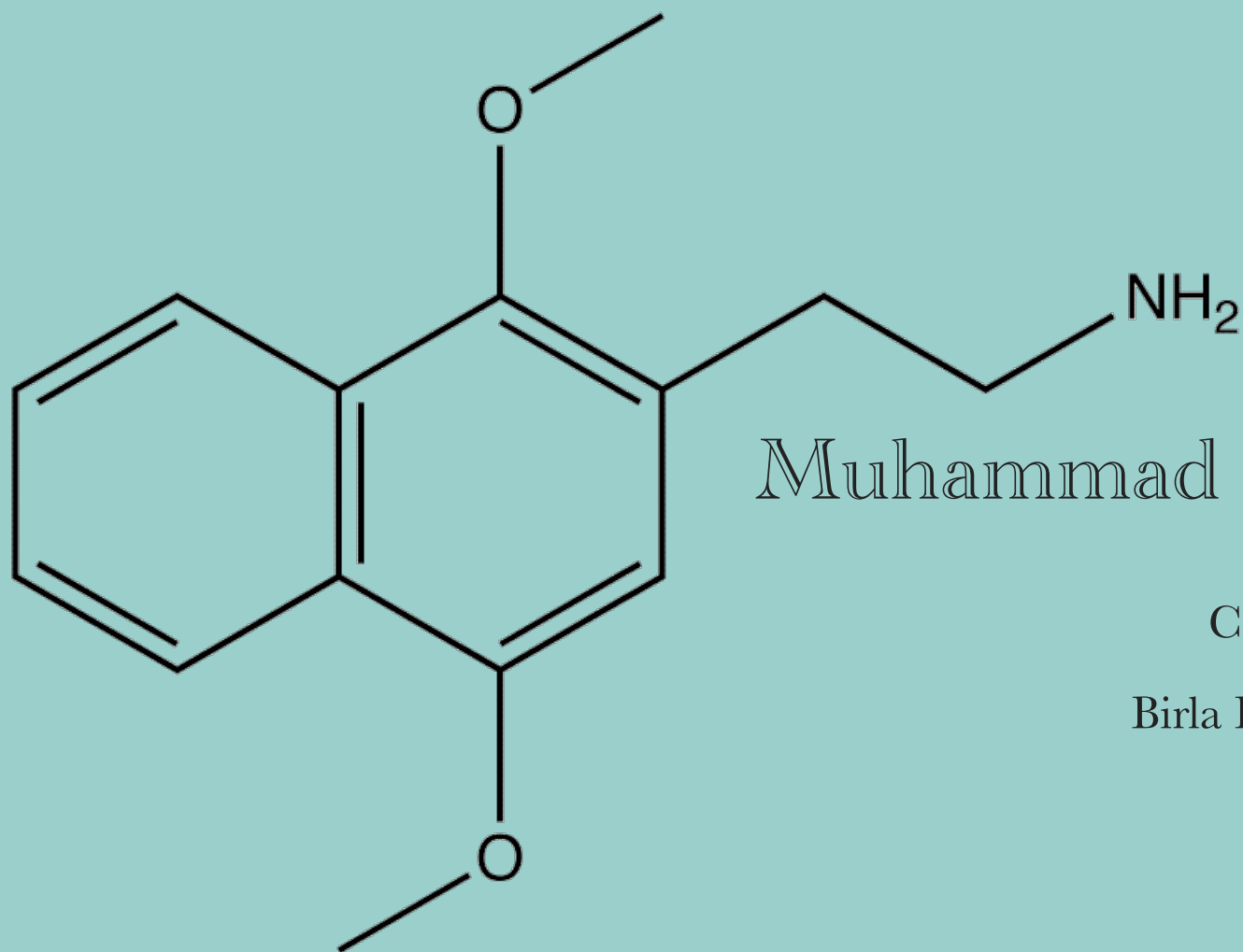


IF THE FACTS DON'T FIT THE THEORY, CHANGE THE FACTS



# Chemistry Investigatory Project

2014-2015

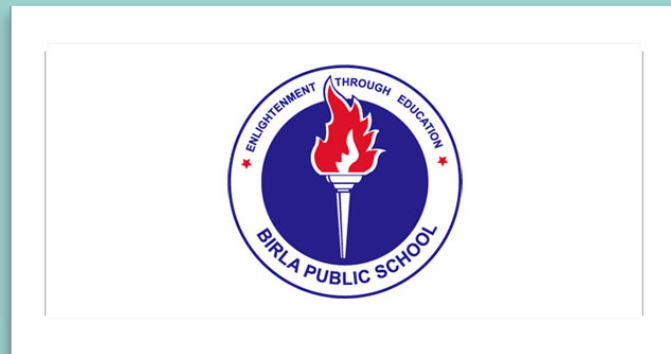


Muhammad Jassim

CLASS Xii - B

Birla Public School

# CERTIFICATE



Birla Public School  
Doha, Qatar  
Chemistry Department

This is to certify that Muhammad Jassim, a student of XII-B has successfully completed the research on the below mentioned project under the guidance of My Sobin Thomas (Chemistry Teacher) during the year 2014-2015 in partial fulfillment of chemistry practical examination conducted by CBSE, Delhi.

# ACKNOWLEDGEMENT

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I would like to thank the Almighty for being able to complete this project with success. Then I would like to thank my principal Mr A.K. Shrivastava who has always been my role model and source of knowledge and wisdom. Then, my Chemistry Teacher Mr Sobin Thomas who has been teaching me Chemistry for two years in-a-row. Without his help this project would be close to impossible.

My thanks and gratitude then of course spreads forward to my lovely parents who has always helped me in my life.

Lastly, my thanks forwards to everyone around me, my friends and my community for being such a strong supporter for my good.



# THOUGHTS

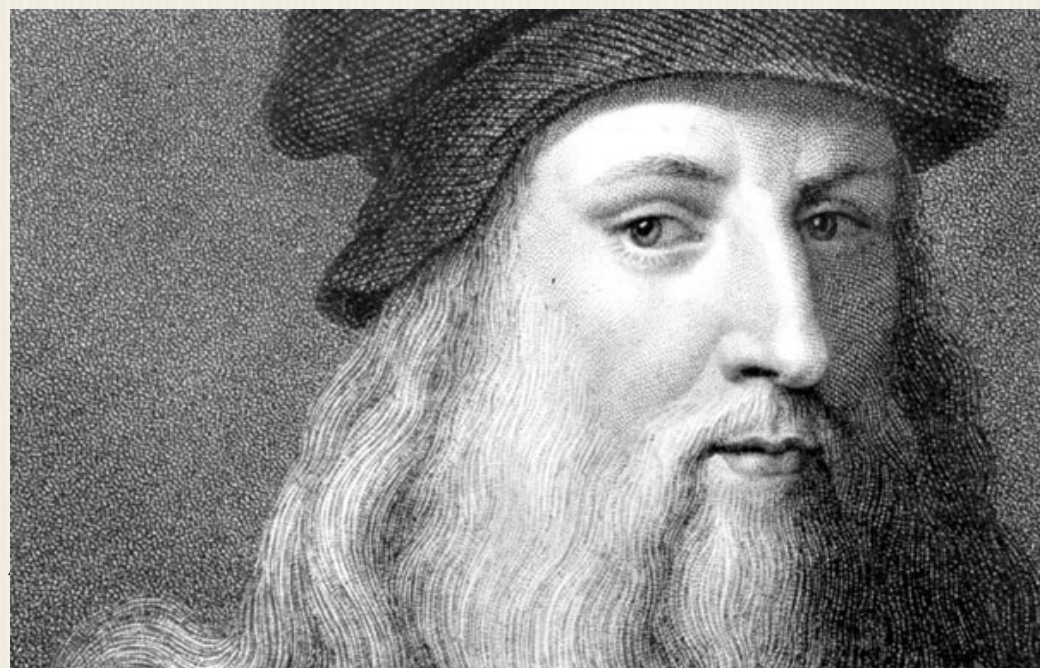
*“Scientific and humanist approaches are not competitive, but supportive and both are ultimately necessary.”*

*-Robert C Wood.*



*“There is no higher or lower knowledge, but one and only one, flowering out of experimentation.”*

*-Leonardo da Vinci.*



# index

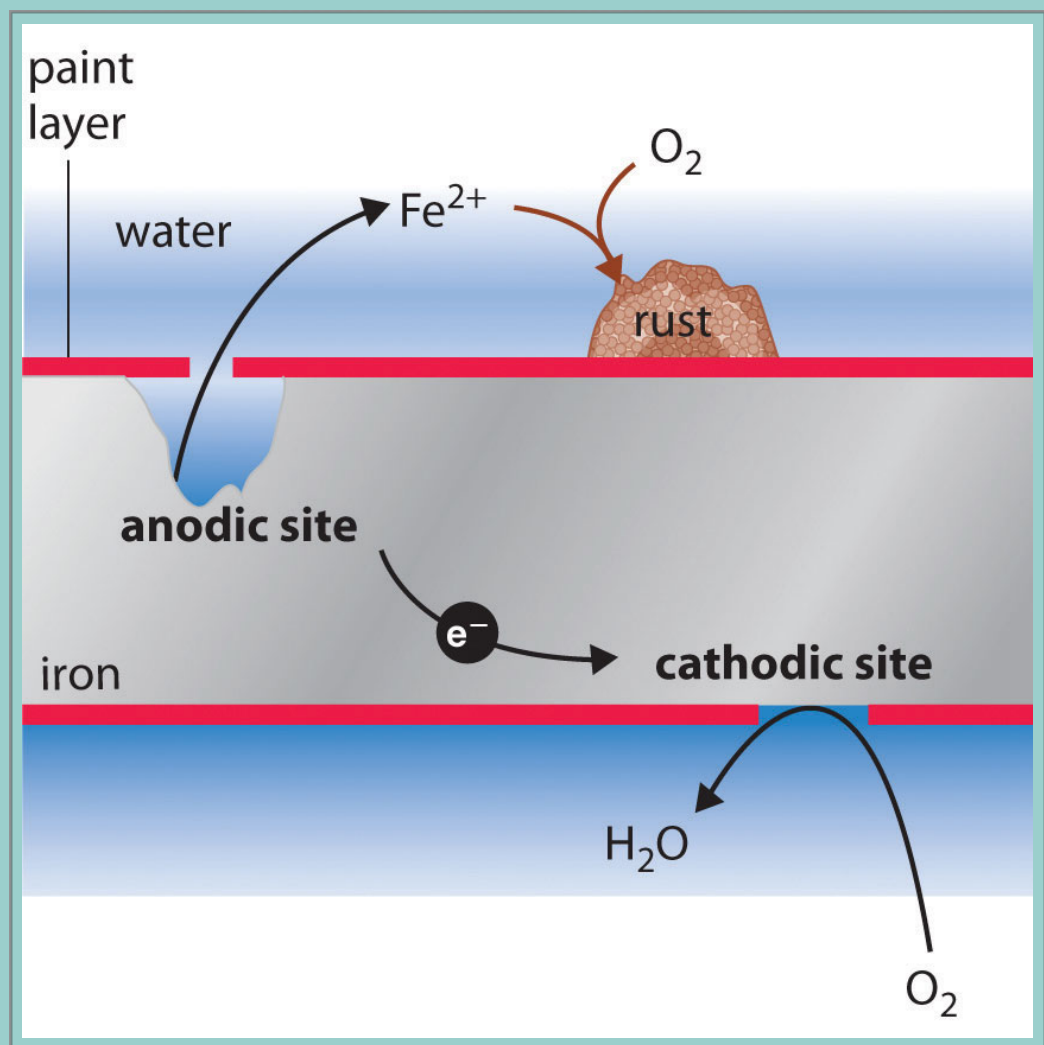
1. Objective
  2. Introduction
  3. Requirements
  4. Procedure
  5. Observation
  6. Result & Conclusion
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# Object of The Project:

In this project the aim is to investigate **effect of the metals coupling on the rusting of iron.**

Metal coupling affects the rusting of iron . If the nail is coupled

with a more electro-positive metal like zinc, magnesium or aluminium rusting is prevented but if on the other hand , it is coupled with less electro - positive metals like copper , the rusting is facilitated.



# INTRODUCTION

Copper Titanium Magnesium Aluminum Manganese Silicon Chrome

Metals and alloys undergo rusting and corrosion. The process by which some metals when exposed to atmospheric condition i.e., moist air, carbon dioxide form undesirable compounds on the surface is known as corrosion, The compounds formed are usually oxides. Rusting is also a type of corrosion but the term is restricted to iron or products made from it. Iron is easily prone to rusting making its surface rough. Chemically, rust is a hydrated ferric oxide.

Titanic's bow exhibiting microbial corrosion damage in the form of 'rusticles'.

## Rusting an Electrochemical Mechanism -

Rusting may be explained by an electrochemical mechanism. In the presence of moist air containing dissolved oxygen or carbon dioxide, the commercial iron behave as if composed of small electrical cells. At anode of cell, iron passes into solution as ferrous ions. The electron moves towards the cathode and form hydroxyl ions. Under the influence of dissolved oxygen the ferrous ions and hydroxyl ions interact to form rust, i.e., hydrated ferric oxide.

## Methods of Prevention of Corrosion and Rusting -

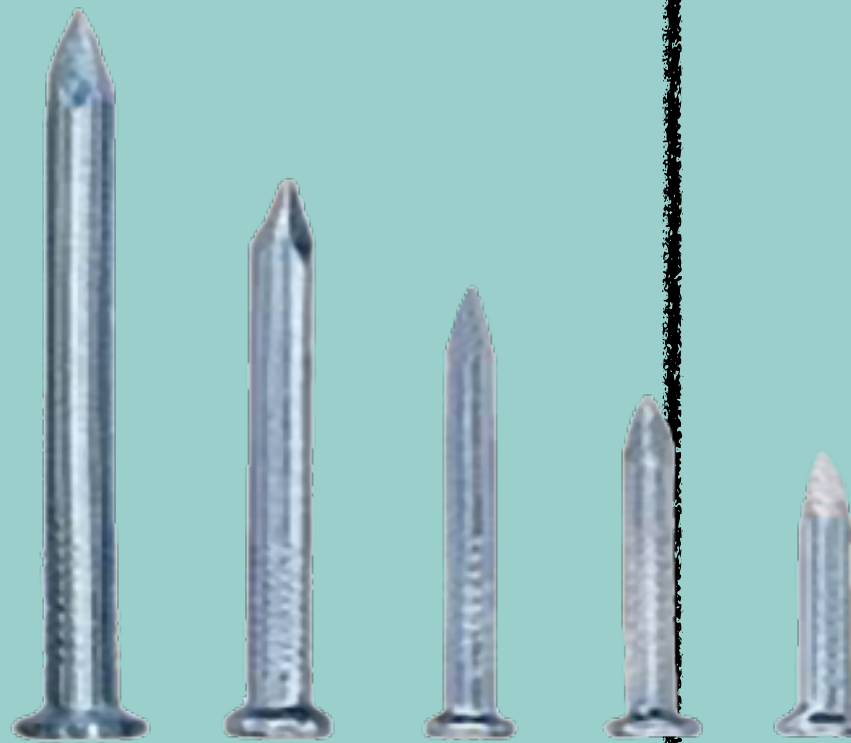
Some of the methods used to prevent corrosion and rusting are discussed here:

- 1) *Barrier Protection* - In the method, a barrier film is introduced between iron surface and atmospheric air. The film is obtained by painting, varnishing etc.
- 2) *Galvanization* - The metallic iron is covered by a layer of more reactive metal such as zinc. The active metal losses electrons in preference of iron. Thus, protecting from rusting and corrosion.



# REQUIREMENTS

- 1) Two Petri dishes
- 2) Four test – tube
- 3) Four iron nails
- 4) Beaker
- 5) Sand paper
- 6) Wire gauge
- 7) Gelatin
- 8) Copper, zinc & magnesium strips
- 9) Potassium ferricyanide solu-



# PROCEDURE

1 - At first we have to clean the surface of four iron nails with the help of sand paper.

2 - After that we have to wind zinc strip around one nail, a clean copper wire around the second & clean magnesium strip around the third nail. Then to put all these three and a fourth nail in Petri dishes so that they are not in contact with each other.

3 - Then to fill the Petri dishes with hot agar agar solution in such a way that only lower half of the nails are covered with the liquids .Covered Petri dishes for one day or so.

4 - The liquids set to a gel on cooling. Two types of patches are observed around the rusted nail, one is blue and the other pink. Blue patch is due to the formation of potassium ferro-ferricyanide where pink patch is due to the formation of hydroxyl ions which turns colourless phenolphthalein to pink.

# OBSERVATION

SL NO	METAL PAIR	NAIL RUST OR NOT
1	Iron-Aluminium	Does not rusts
2	Iron-Zinc	Does not rusts
3	Iron-Magnesium	Does not rusts
4	Iron-Copper	Does rusts

## RESULT & CONCLUSION

It is clear from the observation that coupling of iron with more electropositive metals such as zinc and magnesium resists corrosion and rusting of iron. Coupling of iron with less electropositive metals such as copper increases rusting.

In this experiment, Zinc was more electropositive, so it is oxidised leaving iron nails safe. In this way equipment of several crores Rupees can be saved from rusting.

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